"barad" or "barye" on the other. This discrimination is seemingly as justifiable as that now fully established and familiar to all in the signification of such prefixes as deci- and deka-.

For the purpose of contrasting the application of the dual system of terminology to the various requirements of science, I tabulate below the names and magnitudes of certain of the more familiar pressures dealt with by meteorologists, physicists, and others.

Comparison of scales of pressure now in use and their terminologies.

Nature of the pressure.	Meteorological scale. 1 bar=1 megadyne per square centimeter.	Physical scale. 1 barad / 1 barye = 1 dyne per square centimeter.
Residual gas pressure in highly exhausted vacua, as in electric-light bulbs, X-ray tubes, etc.	Very high vacua=0.01 microbar.	=1 centibarad.
	Ordinary vacua=1 to 100 microbars.	=1 to 100 barads.
Pressure in highest regions of the atmosphere yet attained by sounding balloons (33 kilometers).	=10 millibars	=10 kilobarads.
Pressure of a wind blowing about 50 miles per hour against a wall, a person walking, etc.	=4 millibars	=4 kilobarads.
Sustaining pressure on the supporting wing of airplanes (approximate).	=2 to 2.5 millibars	=2 to 2.5 kilobarads.
Atmospheric pressure at about 100 meters above mean sealevel.	=1 bar=1,000 millibars.	=1 megabarad=1,000 kilobarads=1,000,000 barads.
Pressure of water vapor at its critical temperature.	=220 bars	=220 megabarads.
Pressures at the greatest depths of the sea (10 kilometers).	=1 megabar=1,000,000 bars.	=1,000,000 megabarads. (No customary prefix of higher significance than "mega-" is available.)
Still greater pressures within the domain of geophysics and elsewhere.	Conveniently expressed in terms of megabars with *convenient* numerical factors.	No convenient term available. Requires the term "megabarad" with *large* numerical factors.

It is apparent from this table that probably little or no occasion will ever arise in science to make practical use of the subdivisions micro-, milli-, and centi*barad* of the physical scale, which moreover affords no convenient prefixes or terms to designate the very great pressures. In other words the unit, *barad*=1 dyne per square centimeter, is too small to conveniently meet the general requirements of all branches of science.

On the other hand, in the meteorological scale the submultiples micro-, milli-, centi-, and the unit itself, *bar*, are available to the fullest extent for the small pressures encountered in nature and the great multiples, expressed by the prefixes kilo- and mega-, are needed and available to designate the really great pressures with which science must also deal.

Consistency.—It is claimed the name *bar* must be consistently applied to the basic unit of the C. G. S. system. This argument from consistency loses force when it is noted that the whole C. G. S. system involves a kind of inconsistency of this character.[10]

The *meter* is the international standard of length, but the *centimeter* is adopted as the more convenient unit of length for the basis of the C. G. S. system.

The Director of the United States Bureau of Standards has kindly called my attention to a remedy for the inconvenience in practical science growing out of the size of the units of the C. G. S. system, which remedy was proposed by the International Association on Refrigeration meeting at Paris in June, 1909, and later considered and elaborated by the International Bureau of Weights and Measures.[11] This proposal offers a supplemental system of practical units based, like the C. G. S. system, on the fundamental units of length, mass and time, the units chosen being the meter, kilogram, and second, Here, again, the kilogram in this M.K.S. system introduces an inconsistency of the kind mentioned above for the C. G. S. system.[12] Entire consistency with an arbitrary ideal obviously can not be realized without radical changes in and modification of well-established nomenclature. Several important practical units conforming to the M. K. S. system have been defined and sanctioned by international convention.

The derived units in the C. G. S. system by convention are given names based on Greek roots, whereas the names of the derived units in the M. K. S. system are proposed to be based on the names of great scientists, as illustrated by Volt, Ampére, Watt, etc., and Pascal has been proposed as the name of the unit of pressure.

Summarizing the foregoing we may say that the International Committee on Scientific Aeronautics and the International Meteorological Committee formally adopted and recommended for international use the term *bar*, meaning a pressure of one megadyne per square centimeter, whereas the terms *barad* and *barye*, meaning a pressure of one dyne per square centimeter, have little or only a slender basis of international sanction and appear to be less acceptable to the physicists than the term *bar*, which they use with a different meaning than that sanctioned by international convention. Obviously, therefore, a condition of serious confusion exists in these matters, and it is earnestly hoped that means may be found whereby international action on the part of all interests concerned in this new pressure unit, can be secured at an early date in order to avoid the confusion that must otherwise result.

In the meantime, the U. S. Weather Bureau has no choice but to continue, and doubtless increase, its use of the *bar* as a unit of pressure, in accordance with international convention.

UNITED STATES DAYLIGHT SAVING ACT OF MARCH 19, 1918.

(The U. S. Weather Bureau is so deeply affected by the daylight-saving act that it seems desirable to reprint the text for convenience of future reference.—C. A., jr.)

AN ACT To save daylight and to provide standard time for the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of establishing the standard time of the United States, the territory of continental United States shall be divided into five zones in the manner hereinafter provided. The standard time of the first zone shall be based on the mean astronomical time of the seventy-fifth degree of longitude west from Greenwich; that of the second zone on the ninetieth degree; that of the third zone on the one hundred and fifth degree; that of the fourth zone on the one hundred and twentieth degree; and that of the fifth zone, which shall include only Alaska, on the one hundred and fiftieth degree. That the limits of each zone shall be defined by an order of the Interstate Commerce Commission, having regard for the convenience of commerce and the existing junction points and division points of common carriers engaged in commerce between the several States and with

[10] See also the discussion of consistency in MONTHLY WEATHER REVIEW, March, 1914, **42**: 142.

[11] Procès-Verbaux. 1911. p. 209. Comptes Rendus of the Conférence Générale des Poids et Mesures. 1913. p. 14; 51–60.

[12] See discussions of the proposed units of acceleration and geopotential. "gal", "leo", "leometer", etc., in this REVIEW, January, 1914, **42**: 6, 142. 539. *Also* The Observer's Handbook (Met'l. Off. no. 191), 1913 ed., p. xxiii; 1917 ed., p. xxiii, xxv.

foreign nations, and such order may be modified from time to time.

SEC. 2. That within the respective zones created under the authority hereof the standard time of the zone shall govern the movement of all common carriers engaged in commerce between the several States or between a State and any of the Territories of the United States, or between a State or the Territory of Alaska and any of the insular possessions of the United States or any foreign country. In all statutes, orders, rules, and regulations relating to the time of performance of any act by any officer or department of the United States, whether in the legislative, executive, or judicial branches of the Government, or relating to the time within which any rights shall accrue or determine, or within which any act shall or shall not be performed by any person subject to the jurisdiction of the United States, it shall be understood and intended that the time shall be the United States standard time of the zone within which the act is to be performed.

SEC. 3. That at two o'clock antemeridian of the last Sunday in March of each year the standard time of each zone shall be advanced one hour, and at two o'clock antemeridian of the last Sunday in October in each year the standard time of each zone shall, by the retarding of one hour, be returned to the mean astronomical time of the degree of longitude governing said zone, so that between the last Sunday in March at two o'clock antemeridian and the last Sunday in October at two o'clock antemeridian in each year the standard time in each zone shall be one hour in advance of the mean astronomical time of the degree of longitude governing each zone, respectively.[1]

SEC. 4. That the standard time of the first zone shall be known and designated as United States Standard Eastern Time; that of the second zone shall be known and designated as United States Standard Central Time; that of the third zone shall be known and designated as United States Standard Mountain Time; that of the fourth zone shall be known and designated as United States Standard Pacific Time; and that of the fifth zone shall be known and designated as United States Standard Alaska Time.

SEC. 5. That all acts and parts of acts in conflict herewith are hereby repealed.

Approved, March 19, 1918.

DIAGRAMS SHOWING CONDITIONS AND EFFECTS OF THE DAYLIGHT-SAVING ACT.

By CHARLES F. MARVIN, Chief.

[Weather Bureau, Washington, Apr. 3, 1918.]

Charts XLVI–19 to XLVI–21 of this issue of the REVIEW show the hours of darkness and daylight, including twilight, for selected latitudes from 30° to 60° N., at intervals of 6°. The shaded blocks in the period of daylight show the ordinary hours of industrial labor as advanced and retarded by the operation of the daylight-saving act printed above.

The increasing number of daylight hours during the summer portion of the year for the more northern as compared with the southern latitudes, is a striking and significant feature of the diagrams. The corresponding shortness of daylight during the northern winters is also conspicuous.

The states and countries immediately adjacent to the selected latitudes are indicated on the diagram and the greater advantage resulting from the daylight-saving act, even in the countries north of the extreme northern boundary of the United States, is quite apparent.

It is important to remember that the diagrams are drawn on the basis of *mean solar time*. Accordingly, on the diagrams the hours of labor, etc., are depicted correctly with relation to local sunrise and sunset only for places whose geographic locations fall on or close to the standard meridian governing the time for any particular zone; that is, the diagrams may be assumed to represent true conditions on the 75th, 90th, and other standard-time meridians. However, since each zone comprises a full hour of difference of time, it necessarily results that the saving of daylight effected by the act is increased over that shown in the diagram for the more western portions of the zone up to half an hour, or thereabouts, and is correspondingly reduced in the eastern portions of each zone by an amount which becomes as great as half an hour, or thereabouts.

In connection with a study of the effects graphically set out in the diagrams, and a consideration of the grave doubts surrounding the chronology and history of events resulting from the arbitrary advancement and retardation of clocks involved in any scheme of this sort, it may be well to consider whether it would not ultimately be better, in the history of mankind, to arbitrarily advance the time of each zone a fixed amount—one-half hour or possibly one hour—which would remain the same throughout the year and continuously thereafter, thus seemingly more effectually avoiding the perpetual confusion in fixing the exact time of events that is hardly separable from the alternation between summer and winter. This scheme would always give to mankind the advantages of relatively longer daylight in the afternoons.

[1] The "mean astronomical time" here mentioned is understood to be the time called "mean solar time" by astronomers and meteorologists. It is determined by applying the "equation of time" to the sun's observed position.

These puzzling differences in the kinds of time are explained in "The American Ephemeris and Nautical Almanac for 1918," p. 713-714, and in Todd's "New Astronomy," Chapter VI.—C. A., jr.

"SUMMER TIME" AND THE BRITISH METEOROLOGICAL OFFICE.

By Sir NAPIER SHAW.

[*From the* Twelfth Annual Report of the Meteorological Committee for the year ended 31st March, 1917 (sixty-second year of the Meteorological Office).]

Some addition to the work of the Divisions for Forecasts and Statistics was entailed by the adoption of "Summer-time" from May 21 until the end of September, 1916. The diurnal variations of weather are controlled by the sun, and for climatological purposes the fundamental principle of meteorological work is to note the conditions day by day at the same interval before or after true noon throughout the year. Local apparent time is therefore the proper time for observers to keep for climatological purposes; allowing a certain latitude, local mean time is prescribed in the books of instructions for climatological stations and suitable allowance can be made if Greenwich time is used; *but there is no means of dealing with observations which are an hour further from or nearer to noon in summer than in winter.*[1] As regards the Daily Weather Service, strenuous and very largely successful efforts have been made during the past 50 years to get the contributing stations of all countries of the region extending from Spitsbergen to Algeria and

[1] Italics ours.—EDITOR.